

EXECUTIVE SUMMARY

The maritime mobile frequency band supports maritime communications worldwide. Appendix 18 of the ITU Radio Regulations (RR) defines the channels of the maritime mobile service. These channels support a variety of communication functions including: public correspondence, intership, ship-to-coast, coast-to-ship, port operations, calling and various safety purposes. Safety functions include distress, search and rescue, ship movement, navigation (bridge-to-bridge) communications, and maritime safety information broadcasts.

Mariners in the United States and other countries are experiencing interference on channels allocated to the above functions. The Radio Technical Commission for Maritime Services (RTCM) established Special Committee 117 to investigate the interference and determine if the International Electrotechnical (IEC) standard 1097-7 “*Global Maritime Distress and Safety System (GMDSS)-Part 7: Shipborne VHF Radiotelephone Transmitter and Receiver-Operational and Performance Requirements, Methods of Testing and Required Test Results*” would be sufficient to protect marine VHF radios from interference. In support of this effort, NTIA, in coordination with the Coast Guard and RTCM SC-117, undertook a task to perform tests on commercial and recreational grade marine VHF radios to the IEC standard and perform radiated tests in areas where severe cases of interference are occurring. Laboratory testing of the radios to the IEC standard was performed in Boulder, Colorado. The radiated tests were performed in Savannah, Georgia on the Savannah River and on the Mississippi River in New Orleans, Louisiana. Mariners in both locations have been reporting cases of severe interference in the marine VHF band on the waterways for quite some time now. Some of the channels experiencing the interference are key channels used for safety and bridge-to-bridge communications. The interference is very disruptive to normal operations on the river and is distracting to the radio operators.

The IEC tests and radiated tests were based on receiver SINAD measurements. In the IEC 1097-7 test procedures, the SINAD of a receiver being tested was set to 20 dB by adjusting the desired signal power and then injecting interference into the circuit to reduce the SINAD to 14 dB. The resulting interference-to-signal ratio (I/S) was then calculated in dB and compared to the minimum IEC requirement. In the IEC tests, the interference was simulated using signal generators. The IEC tests simulated adjacent and co-channel interference, receiver saturation (blocking), and intermodulation interference. The radiated tests used emitters that were present in the electromagnetic environment of the test area to degrade the SINAD. The radiated testing revealed that emitters in the environment were causing receiver saturation and intermodulation/cross modulation interference in the radio receivers.

Spectrum recordings were taken during the radiated tests when the SINAD measurements were 14 dB or less. These recordings were used to identify the sources of interference in Savannah and New Orleans. The recordings seem to indicate that the interference is due to NOAA weather broadcasts and land mobile transmitters (1997 *Code of Federal Regulations*, Parts 90 and 22 Title 47) operating within and around the marine VHF band. The antennas of the weather broadcast and land mobile transmitters are located very close to the river’s edge in both locations and transmit at higher power levels than the mobile marine VHF radios. Both of these factors contribute to the severity of the interference. However, it should be noted that the land mobile transmitters are operating in compliance with respect to the FCC rules and regulations for output power, frequency tolerance, and spurious emissions. The NOAA VHF weather broadcasts also seem to be operating properly.

Because they are operating in compliance with the FCC rules and regulations, it would be difficult to impose any operating restrictions on land mobile systems operators. Therefore practical solutions to solve this problem would be to continue the development of receiver standards through RTCM SC-117, encourage mariners to use radios that are more resistant to interference, and develop antenna siting guidelines for future deployment of weather broadcast and land mobile transmitters to reduce interference.